

## WHAT IS CLAIMED IS:

1. A mutant SPE-C toxin or fragment thereof, wherein the mutant has at least one amino acid change and is substantially nonlethal compared with a protein substantially corresponding to wild type SPE-C toxin.
2. A mutant SPE-C toxin according to claim 1, wherein the mutant SPE-C toxin comprises one to six amino acid substitutions; and  
wherein at least one of the substituted amino acids is positioned in a  $\beta$ -barrel of a B-subunit, in an N-terminal alpha helix, in a diagonal alpha helix, or in a surface groove between subunit A and subunit B.
3. A mutant SPE-C toxin according to claim 1, wherein the mutant SPE-C toxin comprises one to six amino acid substitutions; and  
wherein at least one of the substituted amino acids is aspartic acid-12, tyrosine-15, tyrosine-17, histidine-35, asparagine-38, lysine-135, lysine-138, tyrosine-139, or aspartic acid-142.
4. The mutant SPE-C toxin of claim 3, wherein the at least one amino acid substitution comprises the substitution of aspartic acid-12 to alanine, glutamic acid, asparagine, glutamine, lysine, arginine, serine, or threonine; the substitution of tyrosine-15 to phenylalanine, alanine, glycine, serine, or threonine; the substitution of tyrosine-17 to phenylalanine, alanine, glycine, glutamic acid, lysine, arginine, aspartic acid, serine, or threonine; the substitution of histidine-35 to phenylalanine, alanine, glycine, glutamic acid, lysine, arginine, aspartic acid, tyrosine, phenylalanine, serine, or threonine; the substitution of asparagine-38 to alanine, aspartic acid, glutamic acid, lysine or arginine; the substitution of lysine-135 to glutamic acid or aspartic acid; the substitution of lysine-138 to glutamic acid or aspartic acid; the substitution of tyrosine-139 to phenylalanine, alanine, glycine, glutamic acid, lysine, arginine, aspartic acid, serine, or threonine; or the substitution of aspartic acid-142 to alanine, glutamic acid, asparagine, glutamine, serine, threonine, lysine or arginine.

- Sub C2 cont 5
5. The mutant SPE-C toxin of claim 4, wherein the at least one amino acid substitution comprises the substitution of aspartic acid-12 to alanine, the substitution of tyrosine-15 to alanine, the substitution of tyrosine-17 to alanine, the substitution of histidine-35 to alanine, the substitution of asparagine-38 to aspartic acid, the substitution of lysine-135 to aspartic acid; the substitution of lysine-138 to aspartic acid; the substitution of tyrosine-139 to alanine, or the substitution of aspartic acid-142 to asparagine.
- 10 6. The mutant SPE-C toxin of claim 3, wherein the at least one amino acid substitution comprises substitution of tyrosine-15 and asparagine-38.
- Sub C3 15
7. The mutant SPE-C toxin of claim 6, wherein the substitutions are tyrosine-15 to alanine and asparagine-38 alanine.
8. The mutant SPE-C toxin of claim 3, wherein the at least one amino acid substitution comprises substitution of tyrosine-17 and asparagine-38.
- Sub C4 20
9. The mutant SPE-C toxin of claim 8, wherein the substitutions are tyrosine-17 to alanine and asparagine-38 alanine.
10. The mutant SPE-C toxin of claim 1, wherein the mutant has at least one of the following characteristics: the mutant has a decrease in mitogenicity for T-cells, the mutant does not substantially enhance endotoxin shock, the mutant is not lethal, 25 or the mutant is nonlethal but retains mitogenicity comparable to that of the wild type SPE-C toxin.
- 6 30
11. A vaccine for protecting animals against at least one biological activity of wild-type SPE-C<sup>toxin</sup> comprising: an effective amount of at least one mutant SPE-C toxin according to claim 1.

12. A pharmaceutical composition comprising: a mutant SPE-C according to claim 1 in admixture with a physiologically acceptable carrier.
13. A DNA sequence encoding a mutant SPE-C toxin according to claim 1.
14. A stably transformed host cell comprising a DNA sequence according to claim 13.
15. A method for protecting an animal against at least one biological activity of a wild type SPE-C comprising: administering a vaccine according to claim 11 to an animal.
16. A method for reducing symptoms associated with toxic shock comprising: administering a vaccine according to claim 11 to an animal.

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Sub  
B2

add  $B_3$

Add  $C^6$

Add

add E3

add